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ABSTRACT

Many hundreds of hours have gone into the preparation of the multimedia system for the University of Southern Queensland (USQ) unit, Introduction to Management Science. This multimedia system is placed at the heart of a total technology approach to teaching (TTAT) which interlinks various technologies in delivering unit material to both internal and distance education students. The system won the USQ Inaugural Award for Excellence in the Design and Delivery of Teaching Materials for the author in 1997. The results of a survey conducted during the course indicated that students were very enthusiastic about the new multimedia package. This paper contains the an introduction to the project; a discussion of the educational philosophy used in developing the multimedia system; a description of special features of the system; an overview of TATT; a discussion of student survey responses, including two charts illustrating student ratings of user-friendliness and navigational features; and conclusions. (Author/DLS)

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The Effectiveness of a Web-Based Interactive Multimedia System in Tertiary Education

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Abstract

Many hundreds of hours have gone into the preparation of the multimedia system for the USQ unit, Introduction to Management Science. This multimedia system is placed at the heart of a total technology approach to teaching (TTAT) which interlinks various technologies in delivering unit material to both internal and distance education students. The System won the USQ Inaugural Award for Excellence in the Design and Delivery of Teaching Materials for the author in 1997. The results of a survey conducted during the course indicated that students were very enthusiastic about the new multimedia package.

Introduction

Introduction to Management Science is the very first unit within the discipline of Logistics and Operations Management in the Faculty of Business, University of Southern Queensland.

This unit has been growing in popularity over the past nine years (from 50–60 students to 250–300 students per year). The subject provides a basic background and introduction to various decision making tools, techniques and approaches which rely on both quantitative and heuristic models. All students, who wish to take the discipline as their first or second major, or study it as an option, take this unit.

The Unit Leader for Introduction to Management Science (the author) in conjunction with colleagues from the Distance Education Centre of the University of Southern Queensland has designed and developed the multimedia system for this subject. This project has been supported by the Faculty of Business and endorsed by the Flexible Delivery program of the University of Southern Queensland. The main objective of this project is to provide supplementary and additional components, which enhance and complement the existing material and teaching methods.

Educational Philosophy in Developing the Multimedia System

This multimedia system was designed upon considering the fact that a number of different types of media are utilised in delivering a lecture. For instance, audio is used when a lecturer enters a lecture room and starts talking to the students. Text is used when a reference to a section of a book is made. When an image is placed on the overhead projector or drawn on the board, and the lecturer starts explaining various features by moving the hands or the pointer over it, an attempt to make 'animations' is simulated.

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These media (audio, text with links, video/animation) make the lifeless text and images alive (a living book). Hence, those students who are studying in distance mode and cannot take advantage of the teacher/student interaction will benefit from the system.

Above all, multimedia can offer all students the same opportunity, with added features such as the ability to allow the learners to sit in the driver's seat and steer the way towards the goals they wish to set. In the case of this particular system, a prescribed route or series of routes are also incorporated into the system for the benefit of those users who wish to have more guidance.

Special Features

One of the main features of this multimedia system is its ability to facilitate the teaching of complex concepts via specially designed animations and simulations. This feature enables all students, regardless of their geographical location and means of interaction with the University, to enjoy that extra level of explanation which is usually conveyed during a traditional face-to-face lecture or tutorial situation.

For instance, the solution to the classical optimisation problem of finding the maximum area of a rectangular paddock which can be enclosed with a limited amount (say, 400 metres) of fencing is animated in an interesting way.

The animation provides the theoretical and practical approaches in parallel. On the left-hand side, the area of the paddock changes using the same perimeter, and on the right-hand-side, the graph of this change is plotted. A little humour is also included; as the maximum is achieved the cow in the paddock moos to demonstrate her satisfaction with the largest paddock for grazing!

Students are able to interact with the animations and investigate different situations. This type of approach is adopted and used throughout the unit. Hypertext links to explanations and links between various sections of the material are also amongst the features of the system. Students can even launch their Internet NEWSREADER to connect to the NEWSGROUP specially assigned to the Computer Mediated Communication (CMC) for this subject. This is achieved from within the same program.

A Total Technology Approach to Teaching

It should be noted that this multimedia system is also adopted in conducting the face-to-face lectures. This is achieved in a lecture theatre equipped with a multimedia computer, multiscan projector and a large screen. This way of conducting lectures has had many benefits, including:

- instant access to the right piece of information via hypertext links;
- enhanced presentation of material with supplemented sound, graphics and interactive animations; and
- student exposure to more efficient navigational techniques as demonstrated during the lecture.

The NEWSGROUP specially set up for this unit is being used by the author as a means of virtual consultation with students (7 days a week), and for providing guidance and direction

for using the system effectively. Sherry (1996), who notes that there is an increasing level of interactivity between students and teachers even in rural and isolated communities, supports the use of newsgroups and other electronic forms of communication. Their effectiveness has also been demonstrated by the positive feedback received from students participating in the multimedia project.

As we now believe that students construct their own knowledge, with guidance from teachers, many teachers are now offering students resources which encourage their independent exploration of the materials provided (Berge and Collins, 1995). Jedege (1992) claims that constructivism (as it is termed as) does not view knowledge as a fixed entity but also recognises that it is not transferred from one knower to another. It is therefore important that learners be actively engaged with the instructional materials to construct their own meanings through an "interpretive process, which unravels their world in a personally meaningful way." If Jedege is correct, then the more opportunities there are for students to interact with the study materials and the multimedia package, the more likely it becomes that the students will construct their own knowledge of a subject.

In order to motivate students to produce academic outcome in accordance with constructivist guidelines, "Download, Discussion and Quiz of the Week" have become regular features. These tests and quizzes provide instant feedback to students. For instance, the Download of the Week allows students to download new media such as multimedia tests, and the Quiz of the week lets students participate in on-line quizzes. The quizzes, which utilise Internet forms, are electronically sent to the Unit Leader of the course. After processing and marking, a feedback message is e-mailed to each student who participated in the Quiz. This process is not just allowing learners to interact with the materials, it is encouraging them. The feedback is assisting students to gain a better understanding of the subject matter.

Hence, this multimedia system is placed at the heart of a total technology approach to teaching (TTAT) which interlinks various technologies in delivering unit material to both internal and distance education students. This supports the beliefs of Prawat and Floden (1994) who claim that to implement constructivism into teaching, a more "complex interactive and evolving" model of instruction is needed. Perraton (1988) claims that the distance educator becomes a facilitator of learning through the most appropriate choice of the media available. Hence, the decision was made to use the mixture of media chosen for this unit.

What Do the Students Think of the System?

To gain some idea of the students' responses to the material, a survey was conducted with the forty on-campus students who attended the class in the fourth week of the semester. These students were asked to compare this unit with others they had studied that were similar in nature to Introduction to Management Science. Most of the students indicated that they thought the enhanced study materials were better than the material in the other units and that the multimedia package helped them to understand the content of the material better. They also believed that the multimedia system helped sustain interest in the materials.

When asked for their views on the multimedia package, comments such as 'interesting', 'fun', 'good', 'helps us to understand the course better' were the main responses. All the responses indicated that the students had positive thoughts and comments about the package and enjoyed using it.

When asked about the user-friendliness of the system, the students rated it as good to excellent (see Figure 1). Most of the ratings were good to very good and a few felt the user-friendliness was excellent.

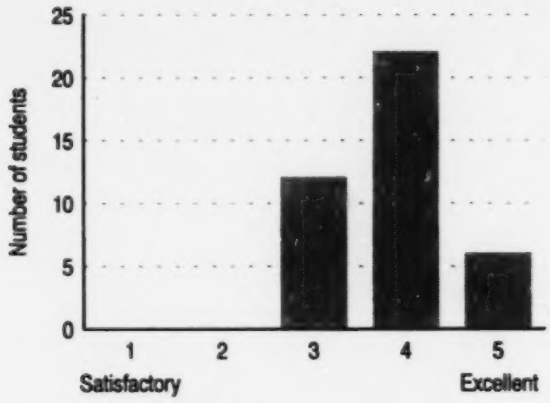

Figure 1. The user-friendliness.

When asked about the navigational features of the system, more students rated them as excellent with, again, all students listing them as good to excellent.

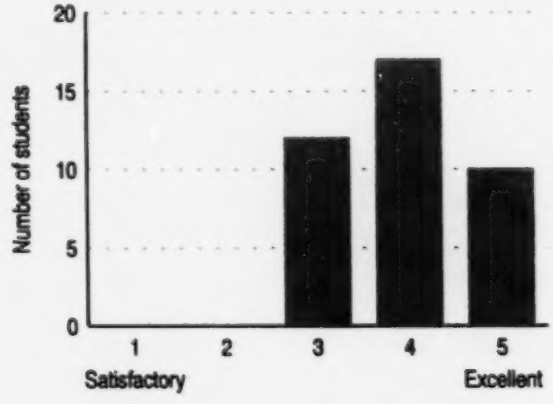

Figure 2. The navigational features.

Conclusions

It can be concluded that the use of interactive multimedia will be a positive step in the direction of enhancing the learning process for this course. The positive responses of the students also demonstrate that the system is an effective means of reinforcing the learning process, particularly for those students who are not able to take advantage of the traditional (face-to-face) mode of delivery.

Integration with the web has allowed the author to update the materials continually and include quizzes and downloads for student further assistance.

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Autobiographical Sketch

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